

In Flight Validation of MASTER Data – A Necessity for Quantitative Geologic Mapping

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Abstract

Quantitative analysis of remotely sensed data requires that the data be calibrated to a known traceable standard. Further, it is necessary to ensure that the data meet those standards in-flight as well as in the laboratory. In 1999 a new 50 channel airborne instrument, the MODIS/ASTER Airborne Simulator (MASTER) began acquiring data. In order to ensure the data were calibrated in-flight, validation experiments were conducted at Ivanpah Playa, CA and L. Tahoe, CA. The Ivanpah experiment was designed to evaluate the visible to shortwave infrared bands (bands 1-25) and the Tahoe experiment was designed to evaluate the thermal infrared bands (41-50).

Both experiments involved measuring the energy from the surface and the atmospheric composition at the time of the MASTER overpass. These data were then used to predict MASTER radiance at sensor and the predicted radiances compared with the MASTER measured radiances.

There was excellent agreement between the predicted radiance at sensor and the measured radiance at sensor. The percent difference between the channels not strongly affected by the atmosphere in the visible – shortwave infrared was typically 1-5% and the percent difference between the thermal infrared channels not strongly affected by the atmosphere was typically less than 0.5%.

These results indicate the MASTER instrument should provide a well-calibrated instrument for Earth Science Studies. It should prove particularly valuable for those studies that require accurate and precise radiance information across the electromagnetic spectrum from the visible to the thermal infrared.

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